

**APPLICATION**

**FOR**

**UNITED STATES LETTERS PATENT**

**OF**

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**FOR**

**IMPROVED BUCKLES WITH OVERRIDING LOCK**

## BACKGROUND OF THE INVENTION

In recent years there has been a tremendous advance in the development of effective plastic buckles for use on belts and in joining straps for backpacks and other applications. The buckles are generally rectangular in shape with a belt or strap loop attachment by at each end. One part is identified as the receptor or female part and the other the male or engaging part, and the loop attachments are cross bars on the outer ends of each of the male or female part. The two parts interlock and typically the receiving part has an attractive front surface which may be ornamented in many respects or left plain.

In these buckles, the engaging part normally includes a pair of locking prongs at the top and bottom and a tongue or tang in the center to guide the mating of the two parts when buckling the device. The tongue or tang is inserted into the receptor part and the prongs are flexible and have integral catches which extend upward and downward in relationship to the face of the buckle. The buckle receiver typically has openings top and bottom where the prongs may be contacted and with the first finger and thumb to be squeezed together simultaneously to release the top and bottom catch allowing the buckle to slide open. Often guide rails are contained within the receiver body and similar rails or grooves are present on the tang to ensure that the two parts engage in a smooth straight sliding movement. This class of buckle is the subject of the John Bianchi Patent No. 4,991,272 assigned to the assignee of this application and U.S. Patent 5,222,279 as well as U.S. Design Patent D341,105.

The combination of the two prongs with catches and guiderails gives a degree of protection from the buckle becoming only partly engaged and inadvertently released.

Others have thought to add some further protection from unintended release such as a button which must be released in addition to the intended release of the two prong catches. Such a secondary button has appeared on the front face of the receiver and acts as a third catch. Such a latch is illustrated by U.S. Patent 5,774,956. In that system, the button must be actuated simultaneously with the two edge prongs.

Simultaneous operation does not appear to be desirable and instead it would appear that the actuating button acts as an overriding lock of the top and bottom prongs preventing their release through mechanical interaction between the front button and each of the top and bottom prongs.

## BRIEF SUMMARY OF THE INVENTION

Faced with this state of the art, it appeared that an independent button controlled lock might add additional degree of security but in actuality it is a modest addition to the buckle. It has been very clear that one can unintentionally release one of the prong catches merely by a downward pressure on the top prong catch or by an upward pressure on the bottom prong catch. Since these are often not readily visible, it is possible for one of the catches to be released and then the second one released and then the total integrity of the buckle rests solely on any button and its third catch. For the most effective buckle, one does not want three independent catches, any one of which can be released independent of the others.

From the foregoing, it was determined that the most effective use of the third button is one that does not have a catch but blocks release of either top or bottom prong until it is actuated. It automatically releases both the top and bottom prongs so that neither the top nor the bottom prong catches can be disengaged without first releasing the third catch. In such a case the thumb and index finger are used to release of the top and bottom prong catches as in the past, <sup>Another</sup> ~~another~~ finger is used to operate the button and allow the top and bottom prongs to move. This allows both the top and bottom prong catches to be released by thumb and finger pressure. Therefore, the three interconnected release devices are effective to maintain the buckle engagement at all times when engagement is intended.

Described herein are several embodiments of this invention namely:

1) a resiliently mounted front button version which is depressed inwardly to allow flexing movement of the top and bottom prongs for their release;

2) a sliding front catch optionally protected by side ribs and likewise must be first operated to allow inward flexing of the top and bottom prongs;

3) a rotating front latch similarly protected and similarly operative; and

4) a front button embodiment where the front button is formed integrally in the female buckle part and thereby always protected within the buckle body.

These various embodiments each have preferred applications.

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## BRIEF DESCRIPTION OF THE DRAWING(S)

This invention may be more clearly understood with the following detailed description and by reference to the drawings in which:

Fig. 1 is a front elevational view of a buckle of this invention;

Fig. 2 is a transverse sectional view of the buckle of Fig. 1 taken along line A-A of Fig. 1;

Fig. 3 is a front elevational view of a slightly modified form of the buckle of Fig. 1 with the prongs shown in dashed lines to indicate the prong positions during the step of opening the buckle;

Fig. 4 is a transverse sectional view similar to Fig. 2 with the buckle in the act of being released;

Fig. 5 is a front elevational view of the male buckle member of the embodiment of Fig. 1;

Fig. 6 is a longitudinal sectional view of the male member of Fig. 5 taken along line 6-6 of Fig. 5;

Fig. 7 is a front elevational view of the female part of a first alternate embodiment of this invention;

Fig. 8 is a longitudinal sectional view taken along line 8-8 of Fig. 7;

Fig. 9 is in exploded perspective view of the lockout assembly of this first alternate embodiment;

Fig. 10 is a front elevational view of the buckle of a first alternate embodiment shown with a portion of a belt shown secured to the male member of the buckle;

Fig. 11 is a longitudinal sectional view of this first alternate embodiment taken along lines 11-11 of Fig. 10 showing the lockout assemblies both in place in the buckle and a similar assembly shown above the buckle;

Fig. 12 is a front elevational view of the lockout assembly of Figs. 10 and 11;

Fig. 13 is a longitudinal sectional view of the lockout assembly of Fig. 12 taken along lines 13-13 of Fig. 12;

Fig. 14 is a front elevational view of the lockout assembly of Fig. 12 oriented at 90 degrees as compared with Fig. 12;

Fig. 15 is a side elevational view of the lockout assembly of Fig. 14;

Fig. 16 is a front elevational view of the male member of the buckle of Fig. 10 with the lockout assembly in one position and the prongs of the male member shown in dashed lines in their

locked condition;

Fig. 17 is a longitudinal sectional view of the male member of the first alternate embodiment of Fig. 16 taken along line A-A of Fig. 16;

Fig. 18 is a front elevational view of the female member of a second alternate embodiment of this invention;

Fig. 19 is a longitudinal sectional view of the female member of the second alternate embodiment taken along line A-A of Fig. 18;

Fig. 20 is an exploded perspective view of the lockout assembly of this second alternate embodiment of this invention;

Fig. 21 is a front elevational view of the second alternate embodiment of this invention shown in assembled lock condition with fragmentary belts shown attached to the male and female members of the buckle;

Fig. 22 is exploded view of the buckle of the second alternate embodiment with the female member shown in a longitudinal section along line A-A of Fig. 21 with the lockout assembly shown both attached to female member and duplicated above the female member and the male member in side elevational view;



Fig. 23 is a front elevational view of the male member of the second alternate embodiment of this invention with the prongs shown in dashed lines to represent their locked condition;

Fig. 24 is a top plan view of the lockout mechanism of the embodiment of Figs. 20-23;

Fig. 25 is a side elevational view of the lockout mechanism of Figs. 20-24;

Fig. 26 is a side elevational view of the lockout mechanism of Figs. 20-25;

Fig. 27 is a top plan view of the lockout mechanism of Figs. 20- 26;

Fig. 28 is a front elevational view of the female member of a third alternate embodiment of this invention;

Fig. 29 is a longitudinal sectional view of the female member of this third alternate embodiment of Fig. 28 taken along lines C-C of Fig. 28;

Fig. 30 is a side elevational view of the female member of Fig. 28;

Fig. 31 is a front elevational view of an assembled third alternate embodiment;

Fig. 32 is a longitudinal sectional view of the buckle of Fig. 31 in a locked condition with this section taken along lines A-A of Fig. 31;

Fig. 33 is a fragmentary perspective view of the buckle of Fig. 31 in the step of being released by finger pressure on the female part button in the direction of the arrow in Fig. 33;

Fig.

The 34 is an exploded view of the male member of the third alternate embodiment of Fig. 31 showing the unlocked condition with prongs depressed in solid lines and in dashed lines in their locked condition and with the unrestrained male member shown to the right;

Fig. 35 is a longitudinal sectional view of the buckle assembly of Fig. 34 taken along lines B-B of Fig. 34; and

Fig. 36 is a longitudinal sectional view of the male member of Fig. 34.

## DETAILED DESCRIPTION OF THE INVENTION

Referring now to Fig. 1 through Fig. 6 of the drawing, a buckle generally designated 10 comprises a partially hollow female member 11 and a male member 12 in assembled condition with respective belt loops 13 and 14 defined by cross bars 15 and 16 respectively. The female and male parts 11 and 12 are shown locked with the female part having recesses 21 and 23 in the upper and lower edges, respectively and the male part 12 with upper and lower flexible prongs 20 and 22 which extend through the openings defined by recesses 21 and 23 of the female member 11, and in locking engagement with catches 40 and 42.

As may be seen in Figs. 1 and 2, the female member 11 has a generally rectangular recess for receiving the male member 12. The male member 12 has a three-part extension including the two prongs 20 and 22 and a resilient cantilevered tongue 26 carrying a release button 30 and integral stop members 32 and 34. The release button 30 extends through the front of the female member through an opening 31. Note that the prongs 20 and 22 each include a respective boss 36 and 38 of which engage the stops 32 and 34 integral with the release button 30 and the cantilevered tongue 26, of the male part 12.

Note in Fig. 2 that the button 30 is preferably sloped on its upper face and is not in locking engagement with the female part and does not include any mating catch.

In accordance with this invention, whenever the buckle is engaged, the male member 12,

including prongs 20 and 22 is inserted into the receptacle R of female member 11 until catches 40 and 42 snap over the mating recess edges of female member 11. At the same time tongue 26 is depressed downwardly or behind the front face of member 11 until it reaches opening 31, when button 30 snaps into opening 31. When catches 40 and 42 are thus engaged the stops 32 and 34 engage bosses 36 and 38 on the male member and the prongs 20 and 22 cannot be depressed to release the buckle until the button 30 is depressed. The depression must be sufficient to move the button 30 and its stops 32 and 34 away from the integral <sup>bosses</sup> 36 and 38. This will allow the prongs 20 and 22 to move inwardly into the buckle, namely, downward in Fig. 1 for prong 20 and upward in the same figure for prong 22 thereby releasing catches 40 and 42.

Sub 2. > This action can easily be accomplished by grasping prongs 20 and 22 with the right hand thumb and a finger and simultaneously applying pressure with the fore finger to depress button 30. The same, of course, can be accomplished using the left-hand. The button 30 and its stops 32-34 cooperate to positively lock prongs 20 and 22 against inward depression. Ribs 33 and 35 protect the button 30.

Please refer now specifically to Figs. 3 and 4, which show a slightly modified form of buckle. The button 30 is depressed and prongs 20 and 22 shown in dashed lines are squeezed to release the catches 40 and 42. This can be accomplished only when the stops 32 and 34 have moved below the level of the bosses 36 and 38. Deflection of the bosses 32-34 is possible due to the resilience of the tongue 26. As soon as finger pressure is released from the button 30 and the prongs 20 and 22 have moved out of the way, the button 30 and its stops 32 and 34 again resume a locking position in contact or immediately adjacent to the bosses 36 and 38 as shown in Fig. 5.

Fig. 6 is a cross sectional view taken along line 6-6 of Fig. 5 and shows the configuration of the male buckle member 12 as separated from female member 11.

In the normal and restrained position of the tongue 26 and prongs 20 and 22 as shown in Fig. 1 and 3, there is little likelihood of the prongs 20 & 22 of the male member 12 catching and being distorted and possibly broken. Therefore the feature of this invention which provides locking of the buckle when engaged, also provides an additional second function of protecting the male member from damage <sup>by female</sup> ~~the male~~ member.

#### THE FIRST ALTERNATE EMBODIMENT

Although the use of the button 30 of the first embodiment is a desirable and preferred embodiment of this invention, it is recognized that another means for locking the male member's prongs from inadvertent release in this type of buckle, is possible. Such an arrangement, including a sliding lock, may also be employed. Such an embodiment is disclosed in Figs. 7 through 17.

Now referring to Figs. 7 through 9, the alternate form of female member 51 may be seen with a belt loop 53 defined by a cross bar 55. The female member includes a generally rectangular recess R, best seen in Fig. 8 and a pair of edge openings 57 and 59, similar to recesses 21 and 23 of the embodiment of Figs. 1-6 for engaging prongs of the male part which is illustrated in Figs.

10 and 11.

The female part 51 includes a pair of longitudinally extending ribs 63 and 65, one on each side of an elongated opening O in the front face of the female part 51 and communicating with the internal recess R. Immediately adjacent to the sides of the opening O are a pair of detent members 67 and 69 which are used to provide an indication of transition from locked to unlocked position and to prevent unintended unlocking of the locking device of this embodiment. This feature is best understood in connection with the explanation, below of Fig. 10.

The locking member of this embodiment, namely the lockout assembly 70 is best seen in Fig. 9. This assembly 70 includes a top member including a transverse extending bar 75 for finger operation and also includes an elongated boss 83, shown in phantom in Fig. 9. The lockout top 71 rests over the front face of the female part 51 and is secured to the lockout bottom 72 which is a generally T shaped member located within the recess R of Fig. 7. The lockout parts top 71 and bottom 72 are secured together by a fastener such as screw 85 with the elongated boss 83 resting in a U shaped groove 81 in the lockout bottom 72. The lockout assembly is able to move longitudinally with respect to the female part 51 by finger pressure on the cross bar 55.

Key to the operation of this embodiment is the fact that the lockout bottom member 72 includes a pair of lobes 77 and 79 which extend laterally with respect to the direction of movement of the lockout assembly 70. The lobes 77 and 79 therefore move from a prong locking position to secure the male buckle member 52 of Fig. 10 to the female member 51 in one position and to a prong unlocking position to allow the prongs of the male member 52 to be released. This is best

understood in connection with Figs. 10 and 11. Also characteristic of the lockout assembly 70 is the fact that the leg of the T shaped bottom member 72 includes an elongated generally rectangular recess 72R which receives a tongue 66 of the male member 50 of Fig. 16, similar to the tongue 26 of the first embodiment. The tongue 66 and the bottom lockout member 72 insure linear engagement of the male and female parts 50 and 51 during the buckling operation.

Now referring to Figs. 10 through 17, the full buckle 50, 51 is shown in locked condition with a belt segment B secured in the normal manner to the male part 52 by encircling its cross bar.

Prongs 58 and 60 are visible extending out of respective recesses 57 and 59. The lobes 77 and 79 of the lockout assembly 70, best seen in Fig. 10 engage bosses 54 and 56, respectively of the prongs 58 and 60. In this condition, the prongs 58 and 60 may not be depressed since each bear against opposite sides of a rigid member, namely, the lobes 77 and 79 of the T shaped lower lockout member 72. This section of the lower lockout member 72 is rigid and reinforced by the tongue 66 as may be seen in Fig. 11 in phantom and in <sup>Fig.</sup>~~fig.~~ 16 which shows the male part 50 in its relationship to the lockout assembly 70.

Suffice it to say, particularly by reference to Figs. 10 and 16, the lockout assembly 70 is operative to allow the prongs 58 and 60 to be depressed when in the most forward position as is shown in Fig. 16 and effectively prevents the compression of the prongs 58 and 60 and release of their integral catch when the lockout assembly is in the retracted position as shown in Fig. 10. The presence of the ribs 63 and 65 of Fig. 7 protect the lockout assembly 70 from most contact which might cause its movement from locked to unlocked position. The ribs 63 and 65 also act to direct the user's finger in the line of locking or unlocking movements. This aids the user since

only tactile reference is needed to operate the lockout assembly 70. The detents 67 and 69 of Fig. 7 provide a tactile indication of movement to an unlocked or locked position. When moved to an unlocked position, the release of the buckle 50 still requires simultaneous or near simultaneous compression of the prongs 58 and 60. A simple forward sliding motion of the hand allows release of the lockout assembly 70 by the forefinger and compression of the prongs 58 and 60 by the thumb and a finger for quick release of the buckle in one natural motion.

## SECOND ALTERNATE EMBODIMENT

In further refinement of this invention, I determined that another positive locking arrangement can be achieved by using a rotary locking assembly which also serves to prevent the depression of the prongs of an edge-squeeze to release type of buckle. Such an embodiment is illustrated in Figs. 18 through 27.

Now referring to Figs. 18 through 23, which show the female member 101 in Fig. 18, the latched buckle, generally designated 100, in Fig. 21 and the male member 102 in Figs. 22 and 23. The female member 101 includes a belt loop defined by a cross bar 103, a pair of edge recesses 105 and 107 and a generally rectangular recess 101R. Female member 101 likewise includes a pair of ribs 109 and 111 and a circular opening 113 of Figs. 18 and 22. The opening 113 receives a rotary lockout assembly, generally designated 115 of Fig. 20.

The rotary lockout assembly 115 includes a top lockout member 116 with an integral crossbar 117 which is used to rotate the lockout assembly 115 from a locked to an unlocked position by



the user. The top lockout member 116 includes a disc portion 119 resting on top of the front face of the female member 101 between the ribs 109 and 111. A spline 121 extends from the lower face of the disc portion 119 through the circular opening 113 in female port 101 and engages a lower or bottom rotary lockout member 123 carrying a pair of lobes 125 and 127. These lobes 125 and 127 are dimensioned so that they will bear against the prongs 104 and 106 of the male member 102 when in a locked orientation and when the rotary lockout member 115 is rotated away from the locked orientation, allow the prongs 104 and 105 of the male member 102 to be pressed inwardly and unlatch. Fig. 21 shows the latched and locked buckle 100. A 90 degree rotation in either direction places the buckle 100 in an unlocked condition ready for unlatching by pressure on the prongs 104 and 106 of the male member 102. It is also clear that less than 90 degrees rotation will allow the buckle to be released by pinching the prongs 104 and 106 simultaneously and drawing the male and female parts 102 and 101 apart.

The rotary lockout assembly 115 can be located on either the male part 102 or on the female part 101. If located on the male part 102 as shown in Fig. 23, the opening 113 of the female part is a slot rather than a round opening. If located on the female part 101, the round opening is used and the male part of Fig. 23 only includes its tongue 108 and lacks the rotary lockout assembly 123. In either case, the rotary lockout assembly 123 prevents the release of the buckle by blocking the inward depression of the prongs 104 and 106 in one orientation and allows their release when the rotary lockout assembly is at any orientation other than with the lobes 125 and 127 engaging or interfering with the depression of prongs 104 and 106.

This embodiment provides protection from any force on the front of the buckle 100 causing the

release of the rotary lockout assembly. An intended rotary movement, usually requiring a thumb and a finger to rotate the assembly 123 is necessary.

### THIRD ALTERNATE EMBODIMENT

During the development of this invention, it appeared that it is also possible to make a locking buckle employing a button release on the female member, utilizing a cantilevered tongue carrying the release button to engage and release the prongs rather than through the presence of lobes. The release button can be molded integrally with the female part. This embodiment is illustrated in Figs. 28 through 36. Fundamental to this embodiment is the fact that the cantilevered carrier of the button engages the prongs of the male part whenever the button is not depressed.

Refer now to Figs. 28 through 36 with particular reference to Fig. 28 showing the female part 151, Fig. 31 showing the latched and locked buckle 150, Fig. 33 showing the process of releasing a prong and Fig. 34 showing the male member 152.

The female member 151 presents the same general appearance as the previously disclosed female members except that the release button 153 remains a part of the female member 151 at all times and, in fact is integrally molded into the female part. The male part 152 of Fig. 34 includes a pair of prongs 154 and 156 and a central forked tongue 158. The tongue 158 aligns the male and female buckle parts 152 and 151 and the forked extensions 160 and 162 of the male part 152 embrace the release button 153 within the female part 151 whenever the buckle 150 is engaged.

The release button 153 is located on cantilevered release button carrier 155 of the female part 151. The female part 151 as seen in end view Figs. 30 and 33 includes side walls 157 and 159 which engage the prongs 154 and 156 respectively in a similar manner as the bosses 32 and 34 of the male member 11 of Figs. 1-7. In this embodiment the release button carrier 155 and the release button 153 remain protected within the female member 151 whether the buckle 150 is latched or unlatched.

For an understanding of the operation of this third alternate embodiment, reference is now made to Fig. 33 which shows a prong 154 in its buckle releasing position as the release button 153 and its carrier 155 have moved downward under finger pressure in the direction of the arrow so that the boss 154B has cleared the side wall 159 of the cantilevered carrier 155. As the buckle separates, the prongs 154 and 156 are removed, and the finger or thumb pressure on the button is released, the plastic memory of the cantilevered carrier 155 returns it to its normal position within the female part 151. To facilitate reengagement, the walls 157 and 159 may be tapered to allow the prongs 154 and 156 to resume their normal locking position shown in Fig. 33 by the dashed line.

## SUMMARY

In each of these embodiments, the buckle parts are preferably fabricated by molding out of such a material as nylon or Delrin of the Dupont Engineering Polymers of Wilmington, Delaware. In each case, the buckle employs two catches on opposite edges of the buckle which are releasable by inwardly applied manual pressure. The embodiments also include an auxiliary stop or lobe which engages each of these catches to prevent them from releasing unless the auxiliary stop or lobe is moved aside to allow the catches to move in a releasing direction. The auxiliary stop or lobes are controlled by a resiliently mounted release button, as in the preferred and third alternative embodiments or by a sliding or rotating locking device, as in the first and second alternative embodiments, respectively. Each of these variants upon this invention are effective to add a greater degree of security to buckles for a variety of uses.

The foregoing embodiments are merely representative of the principles of this invention and are not to be considered as limiting. It is apparent that one, given the teaching present could produce buckles which incorporate the principles of this invention while still having some difference.

Therefore the scope of this invention is not to be considered limited to the embodiments shown but, instead, are defined by the following claims including the scope afforded by the Doctrine of Equivalents.